



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
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ARLINGTON, TEXAS 76011-4005**

May 28, 2004

MEMORANDUM TO: NRC Public Electronic Reading Room

FROM: William B. Jones, Chief, Project Branch E */RA/*
Division of Reactor Projects

SUBJECT: ADDITIONAL RESPONSES TO QUESTIONS AND ISSUES OF
THE TWO FEBRUARY 4, 2004, PUBLIC MEETINGS REGARDING
DIABLO CANYON POWER PLANT

The purpose of this memorandum is to document and provide a copy of followup responses to questions and issues raised during the February 4, 2004, public meetings conducted at the Embassy Suites Hotel in San Luis Obispo, California. The first meeting was a technical meeting to discuss the results of the Special Report submitted following the December 22, 2003, earthquake near San Simeon, California. During the second meeting, NRC provided detailed interim results of an NRC inspection conducted following the December 22 earthquake. The NRC has reviewed the meeting transcript and is providing additional responses in the attachment to questions and comments raised during the meetings. A summary of the NRC independent inspection is also provided in the attachment. Many of the relevant transcript pages are identified following the questions or statements. In addition, we are responding to questions regarding the February 4, 2004, meetings from The Mothers for Peace in a letter to Richard McCarthy, dated February 20, 2004, as posted on their web site <http://www.mothersforpeace.org>.

The meeting attendance list, the NRC's handouts, and a copy of Pacific Gas and Electric's presentation provided during the meeting were promulgated by letter dated February 13, 2004 (ADAMS Accession Number ML040440460). The transcript of these meetings was promulgated by letter dated March 5, 2004 (ADAMS Accession Number ML040700449).

The NRC plans to conduct another meeting with the public in San Luis Obispo, California, on June 9, 2004. This meeting will be conducted to provide members of the community an opportunity to ask questions and provide comments to the NRC staff on matters regarding the Diablo Canyon Power Plant. The NRC will provide a discussion of the NRC's independent inspection activities regarding the affect of the December 22, 2003, earthquake on Diablo Canyon.

A copy of this letter and its enclosure will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams/index.html> (the Public Electronic Reading Room).

Should you have any questions concerning the questions and issues in the attachment, please contact me at 817/860-8147 and I will be pleased to discuss them with you.

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Attachment:
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Responses to Questions, Comments, and Inspection Summary

Response to Questions and Comments

- Q. Why is there not a backup power supply for the emergency notification sirens within the emergency planning zones (transcript pages 79-84, 116-118, 128-131, and 153-156)?
- A. The current federal regulations do not require that the emergency notification sirens, within the emergency planning zones, have a backup power supply. The NRC regulations are established in Appendix E of Title 10 in the Code of Federal Regulations, Part 50 and in NUREG-0654 (FEMA-REP-1), a joint publication of the NRC and FEMA (Federal Emergency Management Agency) published in March 2002 entitled "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants." In the event the emergency sirens are not available and are needed, alternate means of notifying the public have been established, including the use of local law enforcement.

- Q. Has a "transition zone" survey been done in the vicinity of Diablo Canyon to see if there are any faults that are right next to the shore, but not on shore where a geologist has been able to map it (transcript pages 88-92)?

- A. As committed to during the February 4, 2004 meeting, the response to this question was provided by an NRC seismologist.

The area referenced as the "transition zone" has been "surveyed" as part of the long-term seismic program. Specifically, the NRC has required PG&E to implement a long-term seismic program that collects and reviews all relevant geological and seismic data and interpretations of that data as they are developed. This program encompasses information obtained since the 1979 Atomic Safety Licensing Board (ASLB) hearing and is required by License Condition 2.C.(7) to the Diablo Canyon Unit 1 full power license. The long-term seismic program has resulted in the identification of five active faults with significant earthquake potential capability near Diablo Canyon. Except for the Hosgri fault, all are newly recognized or newly determined to be active. The identification of the five new active faults resulted from several activities required by the long-term seismic program which include:

- Acquisition and reprocessing of numerous oil industry seismic reflection profiles, including proprietary data;
- Acquisition of new seismic reflection data, principally offshore but also onshore, to fill the gaps between existing data;
- Analysis of deep-crust-penetrating seismic reflection and refraction lines; and

- Investigation of onshore faults and their offshore extensions, including the San Simeon, Los Osos, Wilmar Avenue, Edna, San Miguelito, San Luis Bay, Olson, and Rattlesnake faults.

The long-term seismic program has focused on faults in the "transition zone." The Wilmar Avenue fault crosses the "transition zone" and was identified through the long-term seismic program. (See Section 2.5.1.2.5 to the NRC's Supplemental Safety Evaluation Report 34, dated June 1991.) Although five previously undetected faults were identified by the long-term seismic program prior to 1991, the NRC recognizes the possibility of undetected coast-parallel faults. As discussed during the meeting, the long-term seismic program provides for reviewing the integrated data obtained from both PG&E and the U.S. Geological Society to assess whether any unknown faults may exist and to characterize any such faults.

The NRC contracted with the University of Nevada, Reno who also raised a concern with the possible presence of an unknown fault during their review of the long-term seismic program. However, based on the NRC staff review of seismic reflection, bathymetry, and dive reconnaissance investigations, the NRC concluded that the presence of a fault within the offshore area near the coast between Point Buchon and Point San Luis is very unlikely. The offshore area between Point Buchon and Point San Luis encompasses the area of the "transition zone" that is closest to the plant. These findings are documented in the NRC's Supplemental Safety Evaluation Report 34. With regard to the affect of the five previously undetected faults on Diablo Canyon, the NRC found that the Hosgri analysis was bounding.

Q. What reviews have been performed relative to linking of multiple segments to form larger earthquakes, such as the Los Osos fault and the Northern Cambria Fault as well as the Sur, Nacimiento, Oceanic and Hausna Faults (transcript pages 100-103)?

A. The long-term seismic program is intended to update the geology, seismology, and tectonic information as it is developed. As documented in Supplemental Safety Evaluation Report 34, PG&E is required to examine and evaluate all relevant geological and seismic data and interpretations since the 1979 ASLB hearing. This ongoing review has included investigation of onshore faults and their offshore extensions, including the San Simeon, Los Osos, Wilmar Avenue, Edna, San Miguelito, San Luis Bay, Olson, and Rattlesnake faults.

The NRC found, with assistance from the University Nevada, Reno and the U.S. Geological Society, that the geological, seismological, and geophysical investigations and analyses conducted by PG&E had appropriately investigated the onshore faults and their offshore extensions. This included examination of multiple fault segments to potentially produce larger earthquakes. The specific reviews performed are documented in the NRC's Supplemental Safety Evaluation Report 34.

With regard to the San Simeon earthquake, available data indicates that it is associated with the Oceanic fault. Although the Hosgri and San Simeon faults are thought to be connected, the Oceanic fault is not considered to be directly connected to the Hosgri-San Simeon fault system.

Q. What actions are the NRC taking to ensure there are no previously undetected thrust faults near and underneath the plant (transcript pages 105-106 and 118-122)?

A. The long-term seismic program updates on the geology, seismology, and tectonics associated with Diablo Canyon continue to support the conclusion that there are no undetected thrust faults near and underneath the plant. The results from the long-term seismic program, which included reviews by the University Nevada, Reno and the U.S. Geological Survey provide that Diablo Canyon Power Plant is built on the San Luis/Pismo Structural Block and that the Pismo syncline is no longer actively folding. Instead, the Pismo syncline is being uplifted as a rigid structural block.

A recent "Preliminary Report on the December 22, 2003, M 6.5 San Simeon, California Earthquake," in Volume 75, Number 2, of the Seismological Research Letters, discusses the probable origin of the San Simeon Earthquake as a blind thrust fault. The NRC plans to review the integration of this report into the long-term seismic program at a later date.

Under NRC's requirements, Pacific Gas & Electric is required to analyze any new hazards for their facility. This would include new information from the U.S. Geological Survey on unanalyzed faults in the vicinity of Diablo Canyon. In Diablo Canyon's operating license, there is a license condition (License Condition 2.C.7) that requires a seismic design basis re-evaluation program and that "additional new data" be assessed to "assure adequacy of seismic margins." This would include an earthquake registered at the Diablo Canyon site, such as the San Simeon event.

In addition, per NRC Safety Evaluation Report Supplement 34 regarding the Diablo Canyon Long-Term Seismic Program, PG&E made the commitment to continue to keep abreast of new geological, seismic, and seismic engineering information and evaluate it with respect to its significance to Diablo Canyon. Should an analysis indicate that a new hazard exists that is outside the existing license basis for the facility, PG&E would be required to make a prompt report of that situation to the NRC with a proposal addressing how PG&E intended to continue safe operation of the station given this new information. The NRC would then initiate a prompt determination as to whether or not to allow the facility to continue to operate. The NRC has the authority to modify or suspend the license to operate the facility immediately. Historically, the NRC has imposed new plant-specific requirements where new safety information has come to light. In some past instances, the new information has also resulted in a decision by the licensee to permanently shut down the facility.

Q. What actions would the NRC initiate in the likelihood that the Diablo Canyon plant is not designed to withstand ground acceleration from a 7.5 magnitude thrust earthquake (transcript pages 106-110 and 112)?

A. If new information is discovered that calls into question the seismic adequacy of Diablo Canyon, the NRC will make a prompt determination as to whether or not to allow the facility to continue to operate. NRC has the authority to immediately modify or suspend the license to operate a facility if safety is at stake.

- Q. Would re-racking the pools again cause any additional sloshing in the pools (transcript page 110-114)?
- A. Any expansion of spent fuel storage in the existing spent fuel pool would require a complete seismic evaluation of the spent fuel racks and the pool structure to ensure that the current seismic design is maintained. Any "sloshing" in the pools is dependent on an earthquake's ground acceleration and frequency and would not result in a loss of cooling to the spent fuel assemblies contained within the pools. The NRC observed through inspection that the spent fuel pool and spent fuel pool assemblies were not adversely affected as a result of the San Simeon earthquake.
- Q. What additional retrofits would be required by the NRC for re-racking the pools (transcript pages 110-114)?
- A. Any modifications to the spent fuel storage would be addressed on a case-specific basis and the proposed modifications assessed using NUREG 0800, "Standard Review Plan." These types of assessments involve multiple disciplines that include seismic behavior and thermal-hydraulic and reactivity considerations.
- Q. How can probabilistic risk assessments be used for safeguards events since they do not include human error (transcript pages 178-180)?
- A. The NRC relies on both probabilistic risk assessments and deterministic means to assess safeguards. It should be noted that, probabilistic risk assessments do provide an integrated review of plant systems based on reliability, availability, and operating requirements. In addition, the plant risk assessments incorporate human reliability into the analysis. Issues involving deliberate acts, including terrorism, are assessed using deterministic means but incorporate risk insights in identifying structures, systems, components, and processes to secure against terrorism. In addition, the Department of Homeland Security provides for the coordination of the Nation's resources, including military and law enforcement to address terrorism.

Risk assessments primarily include human errors of omission such as omitting a proceduralized step or failing to initiate a safety-related function. However, better integration of human reliability into probabilistic risk assessment has long been a recognized NRC concern. The NRC has established a major goal to appropriately model and quantify errors of commission and dependencies. The NRC activities are described in NUREG/CR-6265, Multidisciplinary Framework for Human Reliability Analysis with an Application to Errors of Commission and Dependencies.

The following questions were taken from The Mothers for Peace letter to Richard McCarthy, dated February 20, 2004, as posted on The Mothers for Peace web site <http://www.mothersforpeace.org>.

Q. Is it possible to assure that there was no damage or stress to the plant that occurred during either quake (transcript pages 22-26, 112, 122-126, and 132-134)?

A. As discussed during the February 4, 2004, meetings the NRC has established a firm basis that there was no damage to the Diablo Canyon Power Plant based on the NRC's independent inspections of the plant structure, systems, and components immediately by the NRC's resident inspectors and subsequently by a senior reactor inspector. The inspections included all levels of the turbine, auxiliary, fuel handling, saltwater intake, and the Unit 2 containment buildings. During the inspections, particular attention was given to systems and components having the most risk significance. No site ground effects were noted during the exterior walkdowns and no system, component, or structural damage or evidence of differential deflections were noted.

In addition to the immediate actions taken to ensure there was not any damage to the Diablo Canyon Power Plant, the licensing bases for the plant provided additional assurance since they had been revised to include the Hosgri fault. In the case of the San Simeon earthquake, the magnitude of the ground motion acceleration measured was 5 percent of the Hosgri horizontal free field motion, the acceleration for which the plant was ultimately analyzed. The existing in-service inspection program that was discussed during the meeting (pages 123 through 127 of the transcript) provides a planned systematic inspection of plant systems, components, and supports in accordance with Section XI of the ASME Code. Implementation of this inspection program will serve to further confirm that the earthquake caused no incipient damage.

Q. Is it possible that damage or stress can only be identified if the pipe welds underwent X-rays or other screening that is not apparent to the naked eye (transcript pages 118-126)?

A. No, there are numerous means of determining whether damage may have occurred to a pipe weld through understanding the design basis for a system as well as visual examination of the piping for movement or deflection. Inspection of pipe hangers and supports can provide indication that pipes may have moved and been stressed. During the meetings there were discussions on the types of inspections and testing that were performed to verify there was not damage to the plant systems, structures, or components.

Q. Has the NRC instituted or commissioned an independent study to determine if the ground motion on the Hosgri fault is a thrust or reverse motion which, according to some geologists, could result in greater ground motion? If yes, who has the NRC commissioned to do this independent study? If not, why not (transcript page 112)?

A. The NRC commissioned the U.S. Geological Survey to review the geophysical interpretations contained within the PG&E long-term seismic program report. The University of Nevada, Reno provided an independent assessment of the earthquake potential at the Diablo Canyon Power Plant. The associated technical reports are documented in Appendices C and D to Supplemental Safety Evaluation Report 34.

In the long-term seismic final report, PG&E concluded that earthquake motion on the Hosgri fault is best characterized as a strike-slip fault having a subordinate component of dip-slip. On the basis of the NRC's review and advice from its consultants, the NRC found that the style of faulting on the Hosgri fault is predominantly right-lateral strike-slip, with a subordinate but substantial reverse component. The NRC concluded that the ground motion at the site should be evaluated for an earthquake on the Hosgri fault that is 2/3 strike-slip and 1/3 reverse-slip. Thus the NRC conclusion gives greater weight to the ground motion associated with strike-slip component of motion for the design of Diablo Canyon.

Summary of NRC Independent Inspection Activities

This summary was developed to provide an integrated understanding of the NRC's response to the San Simeon earthquake and the affect on the Diablo Canyon Power Plant. The specific elements to this answer are provided in the meeting transcript (transcript pages 72-76, 94-95, 122-127, 132-135, 161-162, and 180-182).

In summary, the NRC actions in response to the earthquake focused on the following areas:

- The impact of the seismic event on the integrity of structures, systems, components, and containment barriers that are important to the safe operation of the nuclear plant;
- The adequacy of the licensee's response to the event; and
- Whether the event was within the design basis for the nuclear plant.

The NRC's overall response to the San Simeon earthquake consisted of three phases which involve the site resident inspectors and Regional and Office of Nuclear Reactor Regulation (NRR) representatives. The NRR representatives were seismic experts that provided technical expertise to the inspection activities. The first phase, which has been completed, involved the immediate response to the December 22, 2003, earthquake by NRC inspectors. Immediately following the earthquake, both resident inspectors, who were onsite at the time of the earthquake, reported to the control room and performed a detailed review of control board panels to ascertain the status of safety systems and verify that the control room staff had implemented their emergency plan. The inspectors also performed independent visual examinations of selected structures, systems, and components. During these examinations, the inspectors did not identify any broken, shifted, or leaking pipes; damaged support braces; displaced equipment; or cracks or spalling in concrete walls and the floor or the plant's foundation that would indicate any signs of damage.

Phase 2 of the NRC's followup involved an onsite inspection during the week of January 5-9, 2004, and has been completed. The inspection focused on detecting evidence of movement resulting from seismic acceleration and visual examination of accessible portions of selected structures, systems, subsystems, and components to determine whether the seismic event resulted in degradation. The structures, systems, subsystems, and components selected for examination were prioritized based on their risk significance. During this Phase 2 portion of the inspection, the NRC staff concluded that, in order to assure that there was no damage to equipment inside the containment

buildings, it would be necessary to perform a visual examination of selected structures, systems, subsystems, and components inside one of the containment buildings. Accordingly, an inspection was made of the Unit 2 containment's structures, systems, subsystems, and components. No system or structural damage or evidence of differential deflections were detected. The NRC staff concluded that, based on there being no damage and the near identical designs of both units' containment buildings, an inspection of the Unit 1 containment building could be deferred until the Unit 1 refueling outage scheduled to begin in March 2004.

Phase 3 of the NRC's actions are partially complete. Specifically, additional inspections were completed, including the visual inspections in the Unit 1 containment on March 31, 2004, during the refueling outage. In addition, the NRC is reviewing the supplemental Special Report, submitted to the NRC on March 29, 2004.